

CLAIMS

1. A laser oscillator comprising:

a. a discharge tube for exciting laser medium disposed inside by applying energy;

5 b. a first mirror and a second mirror disposed on an optical axis of laser beam emitted from the laser medium excited by said discharge tube;

c. a first mirror holder and a second mirror holder for holding said first mirror and second mirror respectively;

10 d. a plurality of mirror holder connecting members for connecting said first mirror holder and second mirror holder,

e. a discharge tube support for supporting said discharge tube,

15 f. a first fixing part for fixing said first mirror holder to the discharge tube support in a laser beam axial direction and in a vertical direction to the laser beam axis, said first fixing part having a degree of freedom in the rotating direction within the plane including the laser
20 beam axial direction; and

g. a second fixing part for fixing said second mirror holder to the discharge tube support in the vertical direction to the laser beam axis, said second fixing part being slidable in the laser beam axial direction.

25 2. A laser oscillator comprising:

a. a discharge tube for exciting laser medium disposed inside by applying energy;

b. a first mirror and a second mirror disposed on an optical axis of laser beam emitted from the laser medium excited by said discharge tube;

5 c. a first mirror holder and a second mirror holder for holding said first mirror and second mirror respectively;

d. a plurality of mirror holder connecting members for connecting said first mirror holder and second mirror holder;

10 e. a discharge tube support for supporting said discharge tube; and

f. a rib for connecting said plurality of mirror holder connecting members mutually in other portion than the mirror holders, or with the discharge tube support.

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3. The laser oscillator of claim 2, wherein said rib is configured to force the plurality of mirror holder connecting members in mutually central direction.

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4. The laser oscillator of claim 2, wherein said rib is configured to force the plurality of mirror holder connecting members in mutually departing direction.

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5. The laser oscillator of claim 1, further comprising a rib for connecting said plurality of mirror holder connecting members mutually in other portion than the

mirror holders, or for connecting with the discharge tube support.

5 6. The laser oscillator of claim 1, wherein said first fixing part comprises a rotary shaft member disposed so that a shaft thereof being vertical to the laser beam axis, and a rotary shaft support for supporting the rotary shaft member from the mirror holder and discharge tube base, while keeping a degree of freedom in a rotating direction in a vertical plane with respect to the shaft of the rotary
10 shaft member.

7. The laser oscillator of claim 1, wherein an elastic force is applied in the rotary shaft direction of the fixing tool.
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8. A laser oscillator comprising:

a. a discharge tube for passing laser gas inside and exciting the laser gas; and

20 b. a laser gas passage for supplying the laser gas to said discharge tube,

c. wherein a following relation is satisfied.

$$1.1A < B < 1.7A$$

25 where A is an inner diameter of the discharge tube, and B is a width in a vertical direction to a gas flow direction of the laser gas passage near a laser gas inlet of the discharge tube.

9. A laser oscillator comprising:

a. discharge tube for passing laser gas inside and exciting the laser gas; and

b. a laser gas passage for supplying laser gas to said discharge tube,

5 c. wherein a columnar protrusion of height of C from the discharge tube center and inner diameter of D is provided in a laser gas inlet confronting part of the discharge tube, and following relations are satisfied.

$$0.5A < C < 0.9A$$

10 $0.7A < D < 0.9A$

where A is an inner diameter of the discharge tube.

10. A laser oscillator comprising:

15 a. discharge tube for passing laser gas inside and exciting the laser gas; and

b. a laser gas passage for supplying laser gas to said discharge tube,

20 c. wherein a columnar protrusion of height of C from the discharge tube center and inner diameter of D is provided in a laser gas inlet confronting part of the discharge tube, and following relations are satisfied.

$$1.1A < B < 1.7A$$

$$0.5A < C < 0.9A$$

25 $0.7A < D < 0.9A$

where A is an inner diameter of the discharge tube, and B is a width in the vertical direction to the gas flow

direction of the laser gas passage near the laser gas inlet of the discharge tube.

5 11. The laser oscillator of claim 9, wherein said columnar protrusion of height of C from the discharge tube center and inner diameter of D provided in the laser gas inlet confronting part of the discharge tube is composed of dielectric materials.

10 12. The laser oscillator of claim 10, wherein said columnar protrusion of height of C from the discharge tube center and inside diameter of D provided in the laser gas inlet confronting part of the discharge tube is composed of dielectric materials.

15 (13. A laser oscillator comprising:
a. a discharge tube filled with laser gas;
b. electrodes disposed at both ends of said discharge tube; and
c. a high voltage power supply for applying a high
20 voltage between said electrodes,
d. wherein a hole is opened in the discharge tube, and an auxiliary electrode is disposed in said hole, said auxiliary electrode being connected to one of said
25 electrode via a high resistance resistor.

14. The laser oscillator of claim 13, wherein the

position of the hole opened in the discharge tube is located at a distance of $0.4L$ to $0.7L$ from an electrode not connected with the auxiliary electrode, where L is a distance between the electrodes.

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15. The laser oscillator of claim 13, wherein the resistance of said high resistance resistor is $1\text{ M}\Omega$ or more and $100\text{ M}\Omega$ or less.

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